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B28D 1/00

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(56) Documents Cited:  
GB 2288383 A NL 890000183 A  
US 4557246 A US 3945151 A  
US 2884921 A

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(54) Abstract Title: Brick cleaner

(57) A brick cleaning apparatus in accordance with the invention comprises a machine frame 1 having a horizontally arranged elongate tool bar 2 mounted thereon for horizontal displacement over a support surface 3 adapted to receive a layer of bricks 4 to be cleaned. A plurality of planing tools (Fig 2, 5) are mounted on the tool bar 2 such that the planing tools (Fig 2, 5) transmit a shearing force against mortar on the upwardly facing surfaces of the bricks 4 as the tool bar 2 is traversed across the support surface 3.

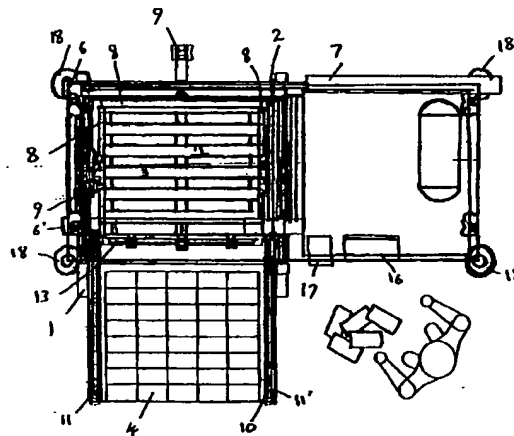


Fig. 1

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At least one drawing originally filed was informal and the print reproduced here is taken from a later filed formal copy.

The claims were filed later than the filing date but within the period prescribed by Rule 25(1) of the Patents Rules 1995.

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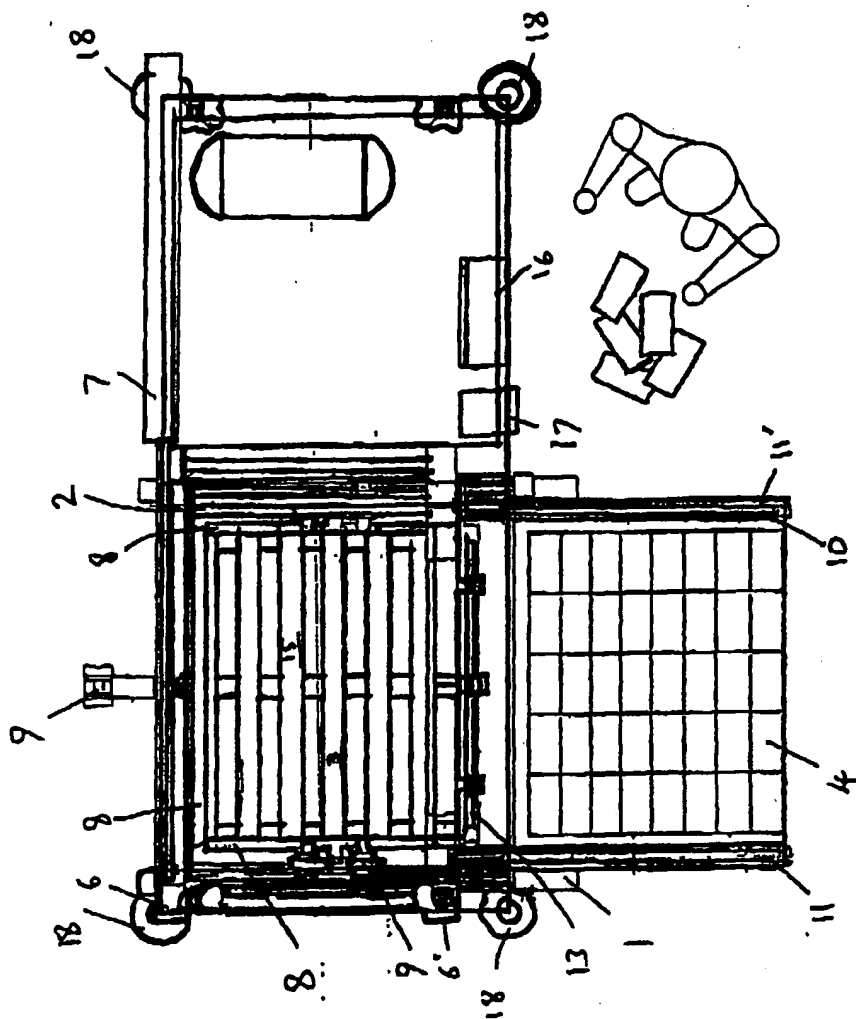


Fig. 1

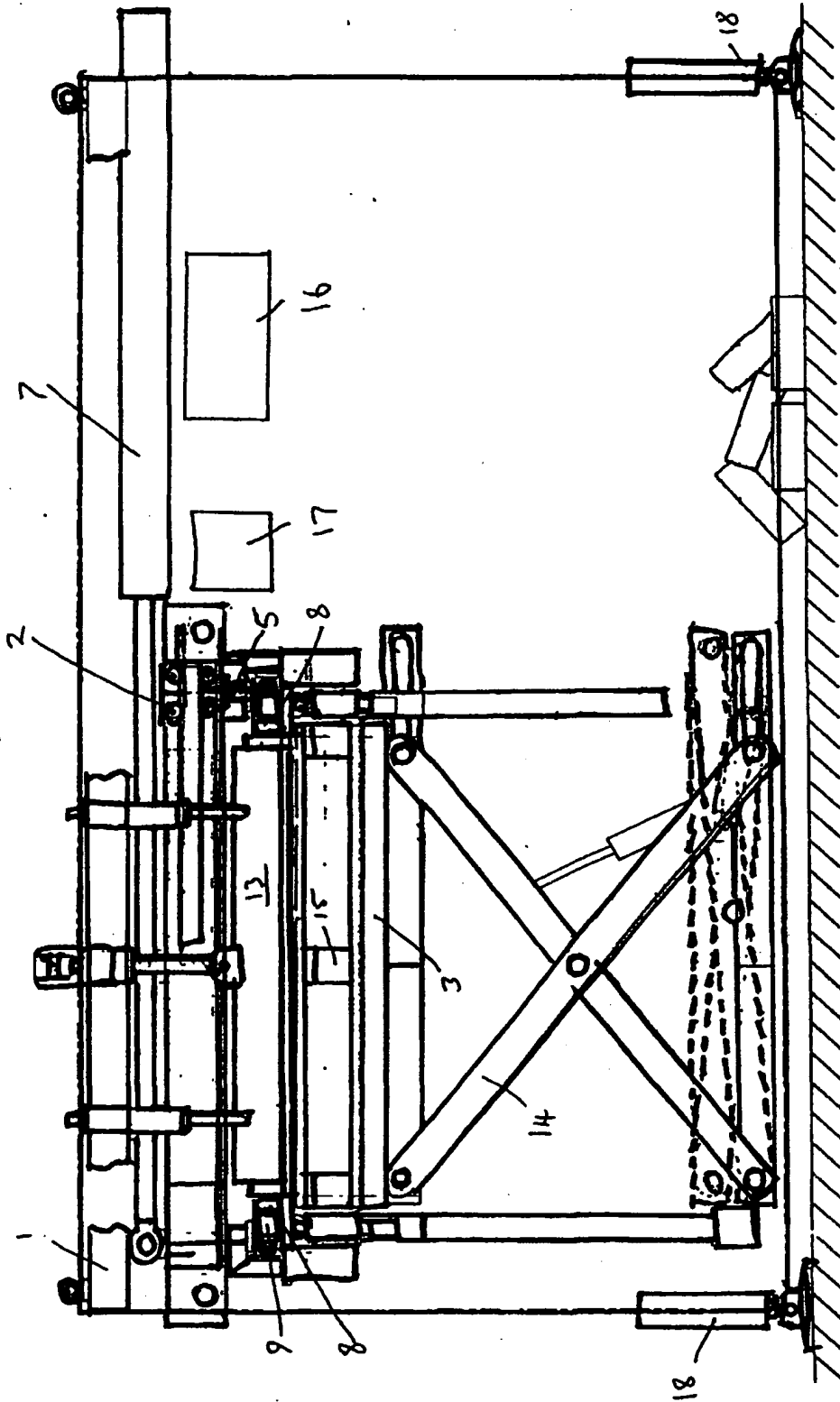


Fig. 2

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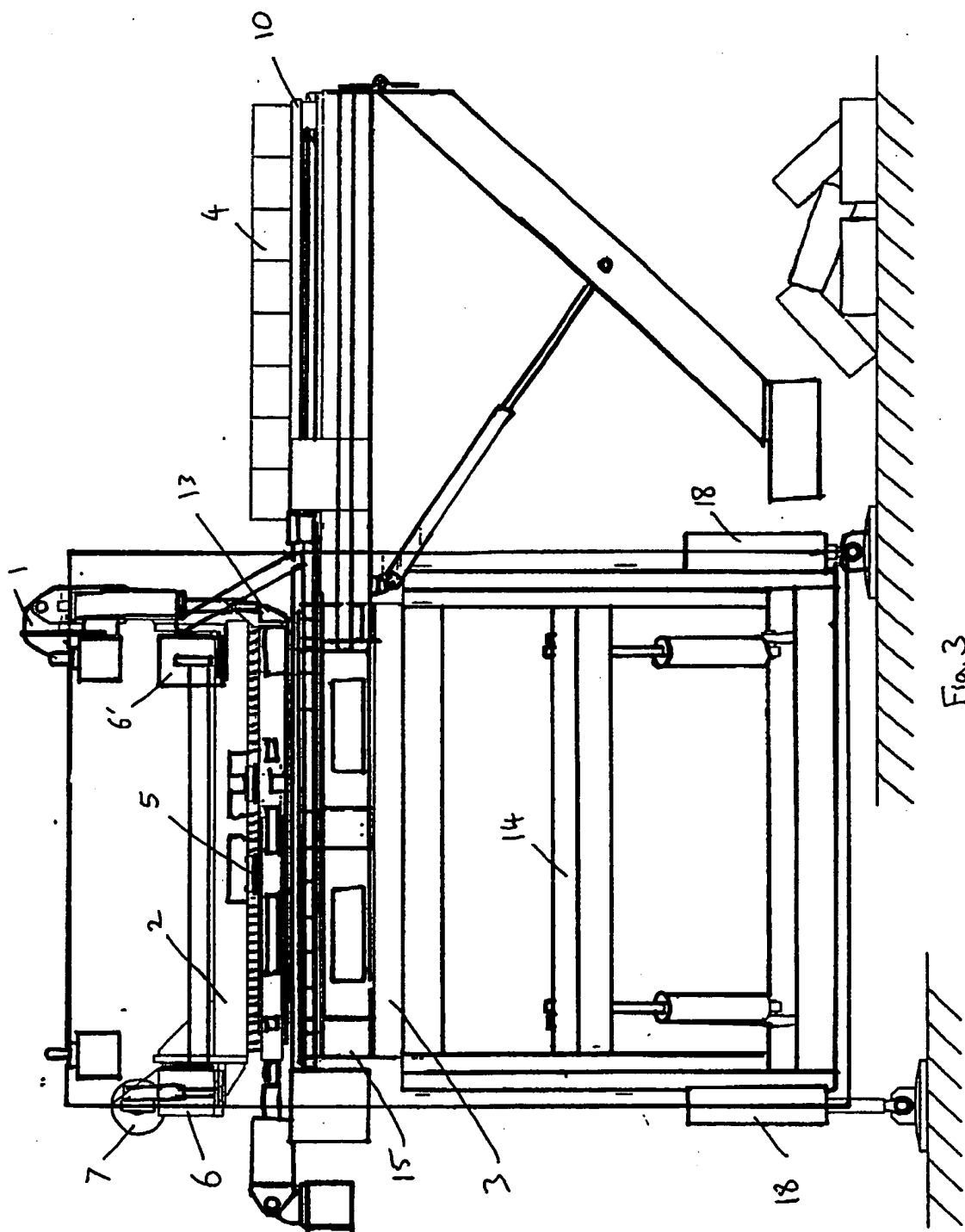


Fig. 3

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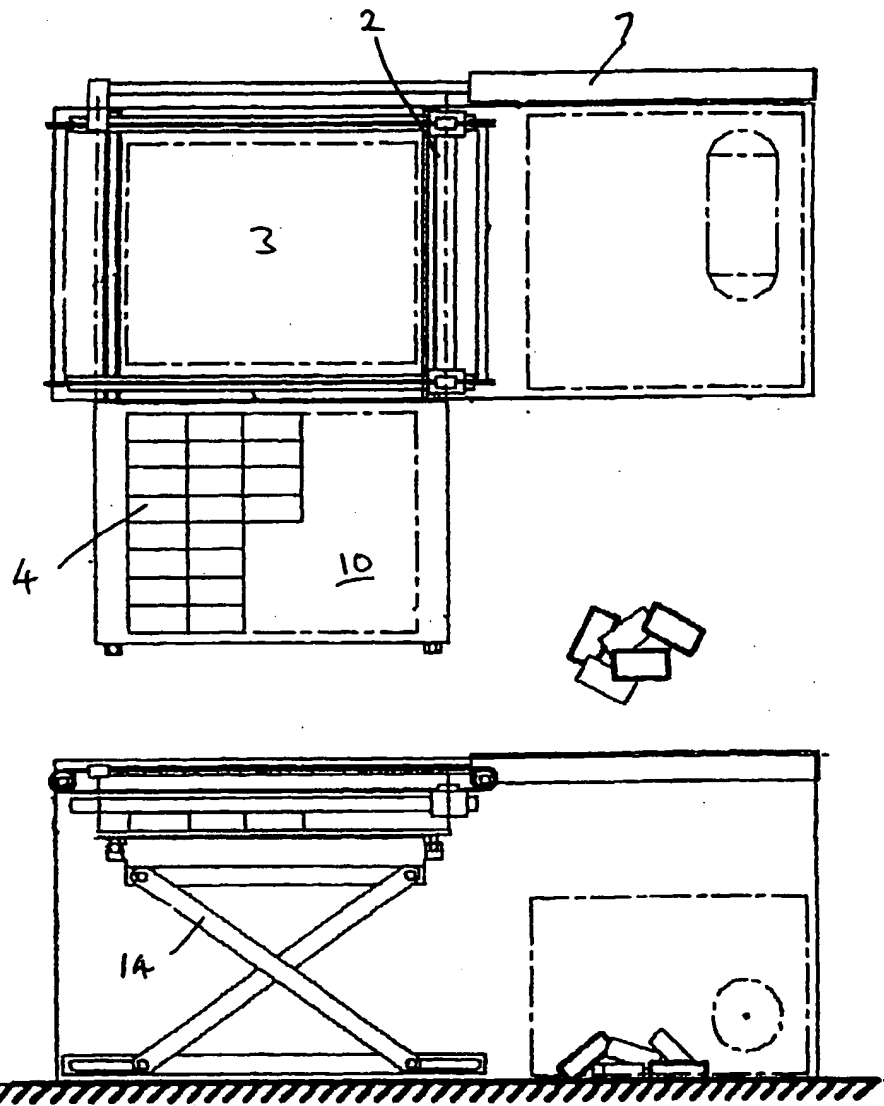


Fig 4

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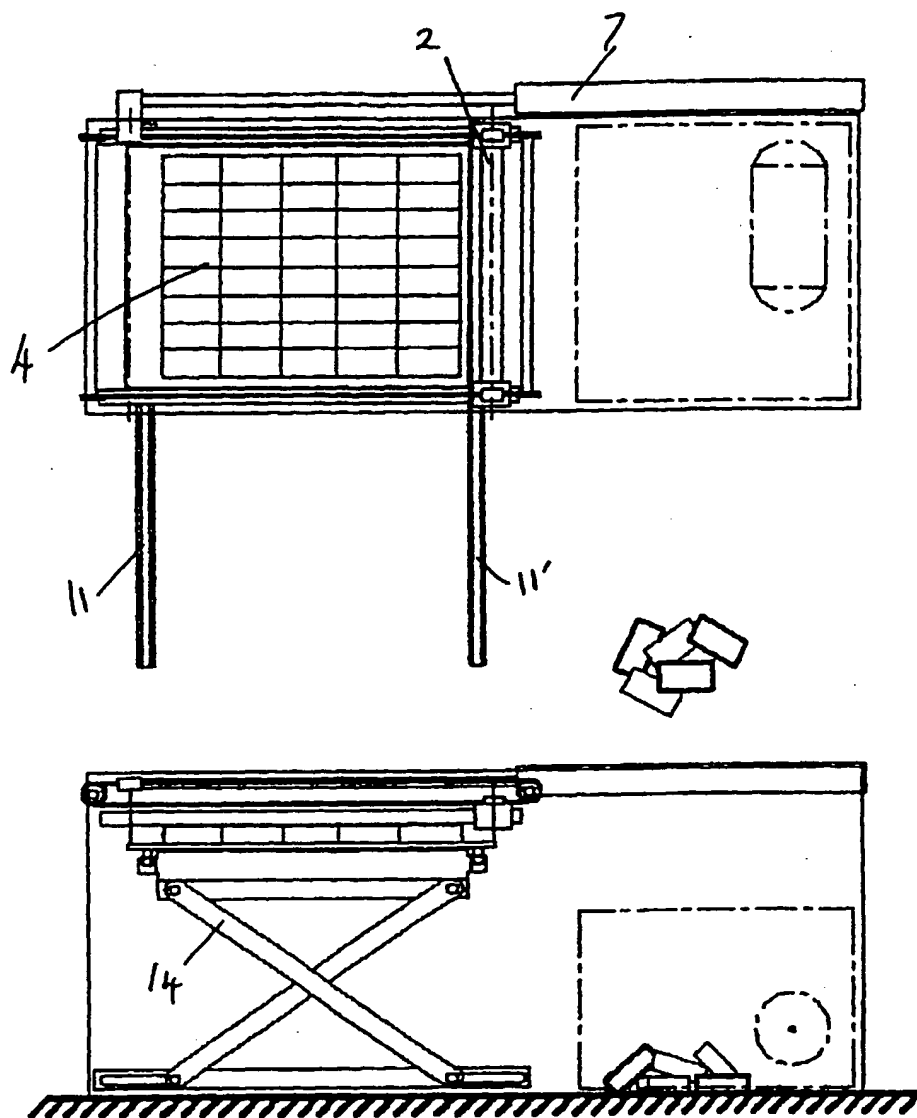


Fig. 5

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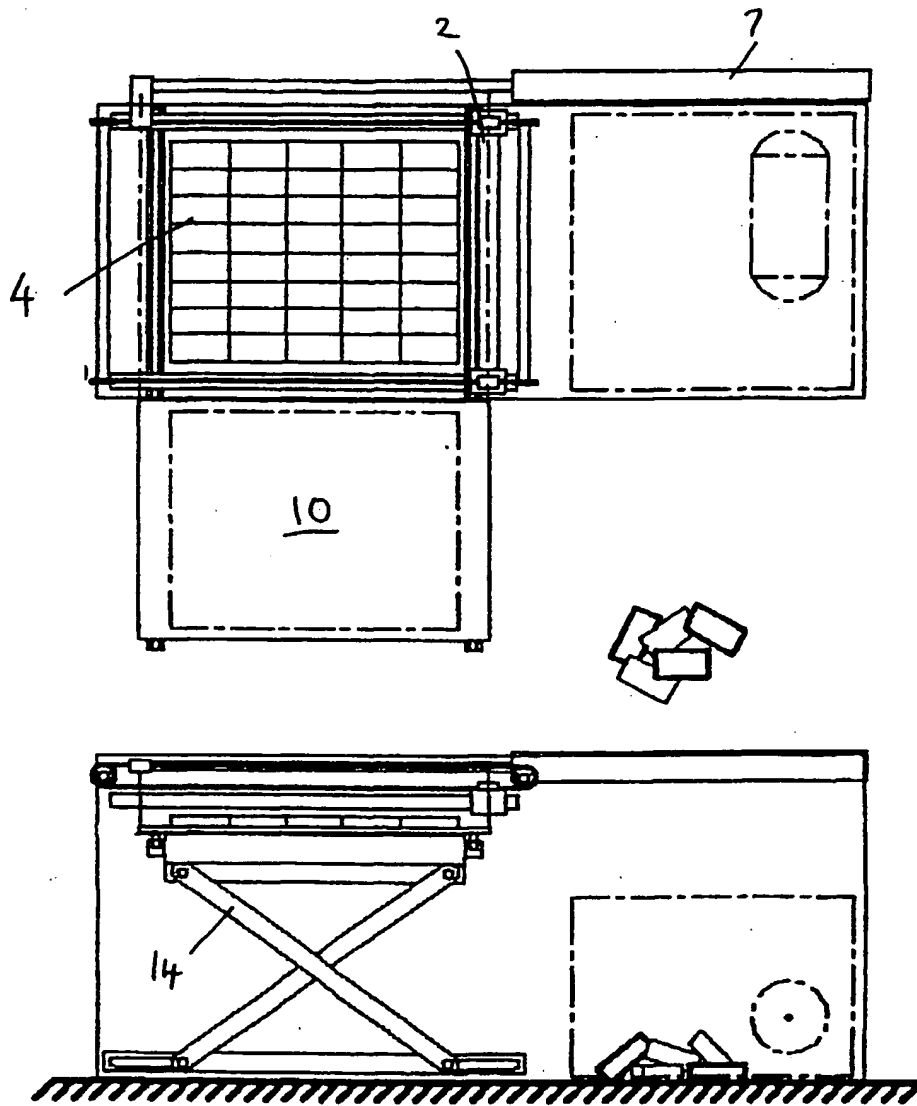


Fig. 6

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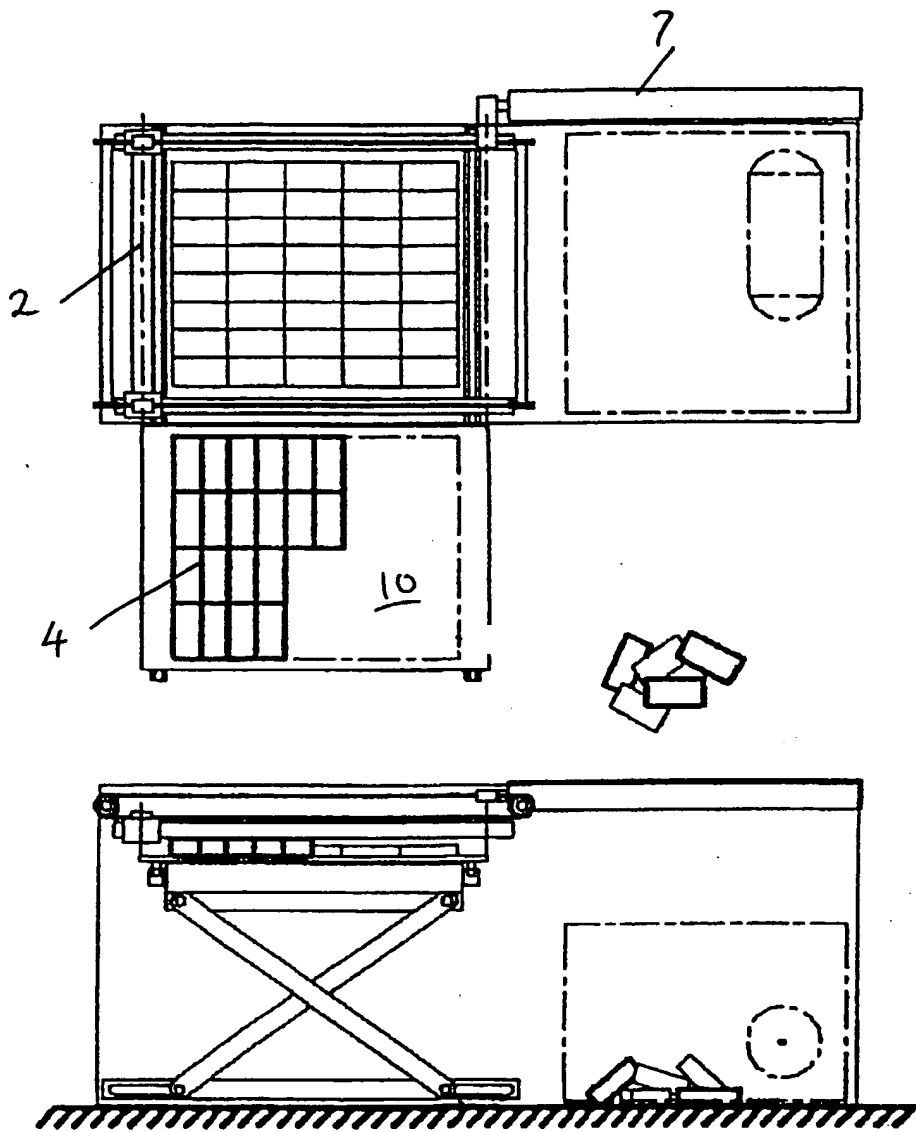


Fig. 7



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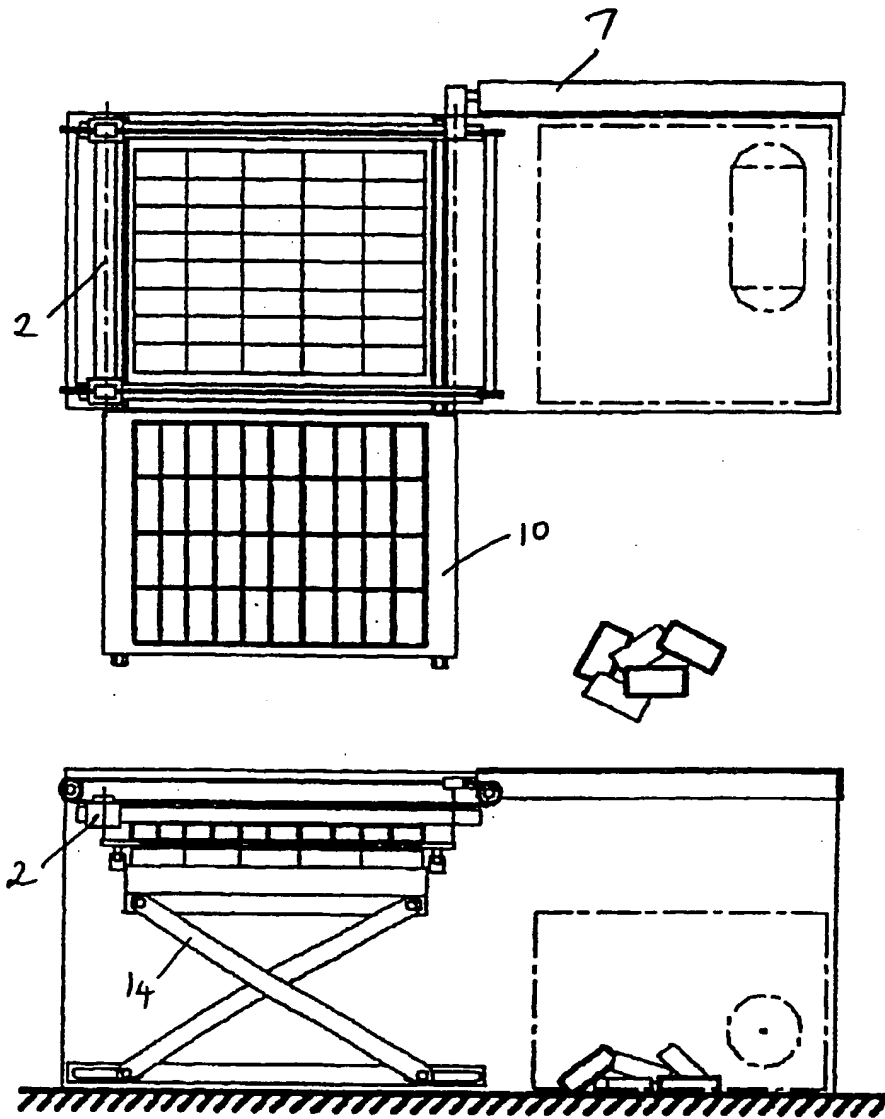


Fig. 8

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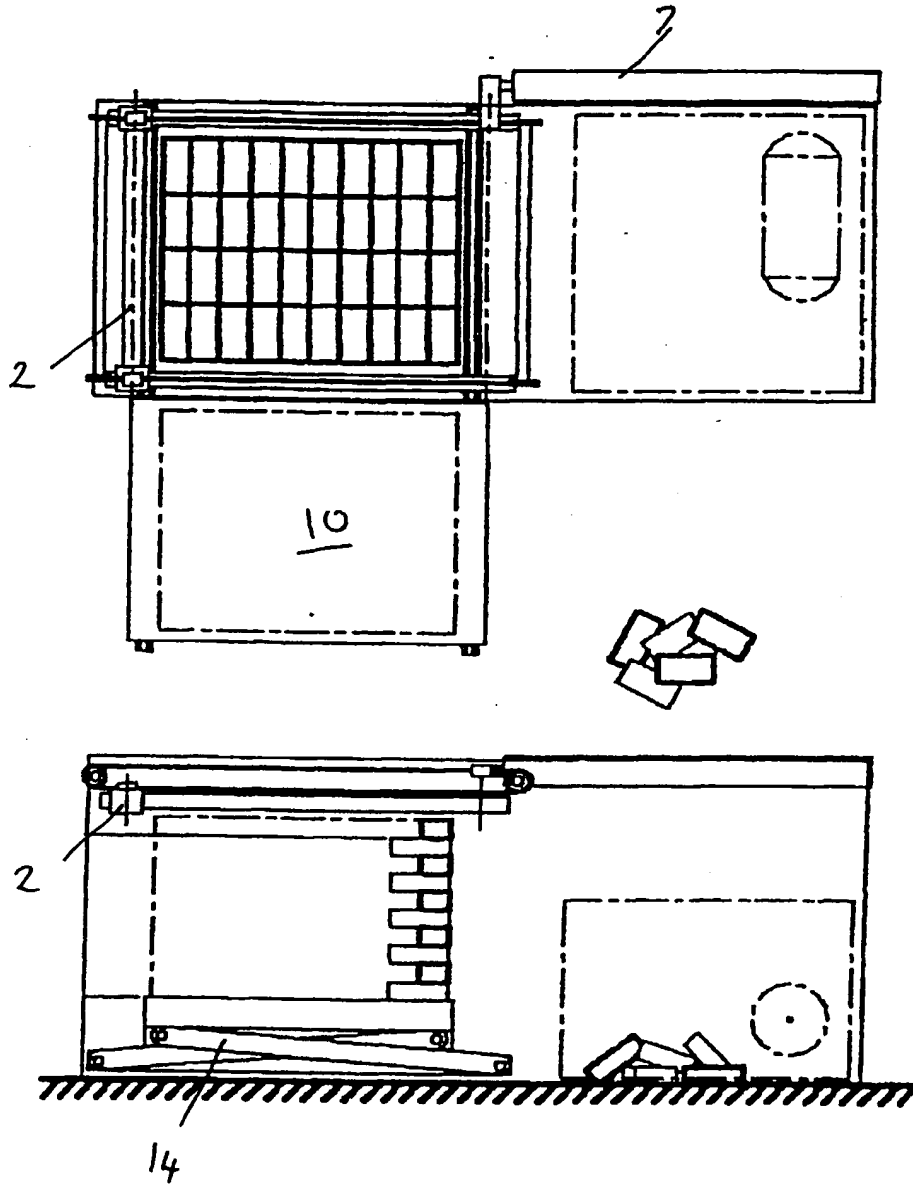


Fig. 9

## **BRICK CLEANING APPARATUS**

The present invention relates to an apparatus for removing residual mortar or cement from used bricks.

Frequently reclaimed or used bricks are required for use in new brickwork or in an extension to an existing building so that the new brickwork blends in with existing buildings or parts of a building. Furthermore, owners/architects wish new buildings to be built using reclaimed bricks because they wish the building to have a traditional or old appearance or they wish the building to be in sympathy with adjacent older buildings.

Currently used bricks are cleaned of residual mortar/cement after a building has been demolished individually by hand or with mechanical assistance. Such known cleaning methods are particularly laborious and slow. A known machine for cleaning reclaimed bricks comprises a vibrating chiseling tool against which an operator presses a brick to remove mortar from an individual brick. The known machine can only clean one brick at a time and may cause vibration related injuries to the operator. Accordingly, the cost of cleaning used bricks is high and the use of reclaimed bricks is often not cost effective in comparison with the cost of new bricks. Furthermore, known methods of cleaning bricks frequently lead to damage to the bricks, rendering them unusable.

It has been noted that the bond between cement/mortar and the surface of a brick is weaker than the bond of the cement/mortar with itself. Accordingly, when an existing building is demolished, residual cement/mortar tends to remain on only one side of a brick. The concept of the present invention is based on the realization that the residual mortar/cement existing on a used brick can be effectively removed by applying a shearing force to said mortar/cement in a direction transverse to the surface of the brick to which the mortar/cement is adhered.

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According to the invention there is provided an apparatus for cleaning used bricks comprising a support surface for receiving a plurality of bricks to be cleaned arranged in a layer with the surfaces to be cleaned arranged facing upwardly, an elongate brick cleaning device for cleaning the upper surface of said layer of bricks and means effecting relative displacement between said brick cleaning device and said support so that the cleaning device acts on the upper surface of the layer of bricks to be cleaned.

Preferably the brick cleaning device is displaceable horizontally or substantially horizontally over the support surface and preferably said support surface is downwardly displaceable to enable layers of bricks to be subsequently located on top of the first layer for cleaning until a stack of layers of bricks is built up. Preferably said stack is provided on a support pallet, which is laterally removable to enable removal of a cleaned stack of bricks from the apparatus.

In a preferred embodiment the brick cleaning device comprises at least one elongate member having a plurality of planing tools mounted thereon and adapted to transmit a shearing force against mortar on the upwardly facing surfaces of the bricks. Preferably several rows of planing tools are arranged one behind the other such that each row of planing tools engages mortar to be removed from the bricks in turn as the cleaning device traverses the layer of bricks. The planing tools in each row may be spaced, with the spacing between planing tools in each row being offset with respect to the planing tools in an adjacent row. The planing tools may be replaceably mounted on the elongate member to permit the replacement of worn tools.

The planing tools may be adapted such that a brick cleaning operation can take place on both strokes of the elongate member, or in only one direction. In the latter case the elongate member would require a cleaning stroke in a first direction and a return stroke in the opposite direction.

Preferably brick clamping means are provided for clamping the layer of bricks to be cleaned during operation of the brick cleaning device.

Preferably a loading tray is provided, said loading tray being moveable between a loading position wherein the loading tray is spaced from the support surface to allow a layer of bricks to be loaded onto the loading tray and a delivery position wherein the loading tray delivers a fresh layer of bricks to be cleaned onto the support surface. A brick retaining means may be provided for retaining a layer of bricks over the support surface as the loading tray is moved from its delivery position to its loading position such that the bricks are deposited onto the support surface.

The present invention will be described further, by way of example, with reference to the accompanying drawings, in which: -

Fig. 1 is a plan view of a brick cleaning apparatus according to the invention;

Fig. 2 is a front view of the brick cleaning apparatus of Fig. 1;

Fig. 3 is an end view of the brick cleaning apparatus of Fig. 1;

Fig. 4 comprises a plan view and front view of the apparatus of Fig. 1 in a first stage of operation;

Fig. 5 comprises a plan view and front view of the apparatus of Fig. 1 in a second stage of operation;

Fig. 6 comprises a plan view and front view of the apparatus of Fig. 1 in a third stage of operation;

Fig. 7 comprises a plan view and front view of the apparatus of Fig. 1 in a fourth stage of operation;

Fig. 8 comprises a plan view and front view of the apparatus of Fig. 1 in a fifth stage of operation;

Fig. 9 comprises a plan view and front view of the apparatus of Fig. 1 in a subsequent stage of operation.

As shown in the drawings, the brick cleaning apparatus in accordance with the invention comprises a machine frame 1 having a horizontally arranged elongate tool bar 2 mounted thereon for horizontal displacement over a support surface 3 adapted to receive a layer of bricks 4 to be cleaned. A plurality of planing tools 5 are mounted on the tool bar 2 such that the planing tools 5 transmit a shearing force against mortar on the upwardly facing surfaces of the bricks 4 as the tool bar 2 is traversed across the support surface 3.

Several rows of planing tools 5 are arranged one behind the other such that each row of planing tools engages mortar to be removed from the bricks 4 in turn as the tool bar 2 traverses the layer of bricks 4. The planing tools 5 in each row are spaced apart, the planing tools 5 in adjacent rows being offset with respect to one another.

Opposed sets of planing tools 5 are provided on either side of the tool bar 2 such that mortar/cement can be removed from the bricks 4 on both strokes of the tool bar 2 (i.e. upon movement of the tool bar in either direction).

The tool bar 2 is driven by a pair of endless belts or chains 6,6' connected to either end of the tool bar 2 running on sprockets at each end of each belt, the sprockets being interconnected by at least one shaft extending across the width of the support surface 3 and being rotatably mounted on the machine frame 1, such that the belts or chains 6,6' are constrained to move at the same speed, reducing the risk of skewing of the tool bar 2 during operation. A hydraulic or pneumatic actuator 7 connected at one end to the machine frame 1 and at the other end to one of the drive belts or chains 6 is provided for traversing the tool bar 2 across the support surface 3.

Brick clamping bars 8 are provided on at least two sides of the support surface 3 (three in the preferred embodiment) for clamping the layer of bricks to be cleaned during operation of the tool bar 2, each clamping bar 8 being

mounted on the machine frame for movement between an inoperative position, wherein a layer of bricks may be loaded onto the support surface, and an operative position, wherein the clamping bars 8 engage the sides of a layer of bricks to be cleaned to hold the bricks in place during the cleaning process. Hydraulic or pneumatic actuators 9 are provided for moving the clamping bars 8 between their inoperative and operative positions and to provide the required clamping force.

A loading tray 10 is slidably mounted on spaced parallel slide ways 11,11' mounted on the machine frame 1, the loading tray 10 being moveable between a loading position wherein the loading tray is laterally spaced from the support surface 3 to allow a layer of bricks 4 to be loaded onto the loading tray 10 by an operator and a delivery position wherein the loading tray 10 delivers a fresh layer of bricks to be cleaned over the support surface 3. When in the loading position the operator has access to three sides of the loading tray 10 to avoid overstretching and possible resulting injury while placing a fresh layer of bricks to be cleaned onto the loading tray. A hydraulic or pneumatic actuator (not shown) is provided for moving the loading tray between its loading and delivery positions.

The loading tray 10 and at least a portion of its slide ways 11,11' are pivotally mounted on the machine frame 1 such that the loading tray 10 can be lowered from a horizontally extending operative position to a vertical stowage position to reduce the overall dimensions of the apparatus during storage and transportation.

A brick retaining member 13 is provided for retaining the layer of bricks 4 loaded onto the loading tray 10 above the support surface 3 as the loading tray 10 is returned to its loading position from its delivery position. The retaining member 13 comprises a bar mounted on the machine frame 1 for movement between a raised inoperative position, wherein the loading tray 10 and a layer of bricks 4 to be cleaned thereon can pass beneath the retaining

bar 13 as the loading tray 10 is moved from its loading to its delivery position, and a lowered operative position, wherein the layer of bricks 4 on the loading tray 10 are retained over the support surface 3 as the loading tray 10 is returned to its loading position from its delivery position.

The support surface 3 is mounted upon a scissor lift 14 such that the support surface 3 is downwardly displaceable to enable layers of bricks to be subsequently located on top of the first layer for cleaning until a stack of layers of bricks is built up. A support pallet 15 is placed upon the support surface 3 upon which the stack of bricks is placed, such that the support pallet 15 can be laterally removable from the machine frame 1 once a stack of cleaned bricks has been built up thereon to enable removal of a cleaned stack of bricks from the apparatus.

The dimensions of the apparatus are such that the loading tray 10, support surface 3, retaining member 13 and clamping bars 8 can handle a layer of 40 standard sized bricks (4.5" wide by 9" long [114.3mm x 228.6mm]) and the support surface 3 and scissor lift 14 are dimensioned to receive a standard wooden pallet of 1200mm x 1000mm. The machine frame 1 and scissor lift 14 are adapted to permit a stack of 10 layers of cleaned bricks to be built up on the support pallet 15 such that a stack of 400 bricks can be built up on a single pallet 15.

A control panel 16 is provided to allow the operator to safely control the various operations of the brick cleaning apparatus. A separate brick end cleaning device 17, such as a vibrating chisel, may be provided on the machine frame 1 adjacent to the operator to permit the operator to manually remove any mortar/cement from the ends of any bricks, if required.

The operation of the brick cleaning machine will now be described with reference to Figs. 4 to 9.



With the scissor lift 14 in its lowermost position, an operator initially loads an empty pallet 15 onto the support surface 3 via the open end of the machine (in the direction viewed in Fig. 2). The scissor lift 14 is then operated to raise the pallet 15 to its working height to receive the first layer of bricks. The apparatus is now as shown in Fig. 4 with the loading tray 10 in its loading position.

The operator loads a layer of 40 bricks onto the loading tray 10, each brick being arranged with its surface to be cleaned (i.e. surface upon which there exists mortar/cement) facing upwardly. The brick end cleaning device 17 may be used to manually remove any mortar/cement from the ends of any bricks, if required.

Next, with the retaining member 13 and the clamping bars 8 in their inoperative positions, the operator selects the appropriate control on the control panel 16 to move the loading tray 10 from its loading position to its delivery position as shown in Fig. 5. The retaining member 13 is lowered to its operative position and the loading tray is moved back to its loading position, whereby the layer of bricks to be cleaned is deposited onto the pallet as shown in Fig. 6.

Next the brick clamping bars 8 are moved from their inoperative position to their operative position wherein the clamping bars 8 and retaining member 13 engage the layer of bricks to be cleaned to hold the bricks in place during the cleaning process. The tool bar 2 is then horizontally traversed across the support surface 3 from one side to the other by actuating the relevant hydraulic or pneumatic actuator 7 such that the planning tools 5 mounted thereon engage mortar/cement to be removed from the layer of bricks to transmit a shearing force to said mortar/cement such that said mortar/cement is removed from the uppermost surfaces of the bricks.

Meanwhile the operator begins to place a fresh layer of bricks to be cleaned onto the loading tray, arranging such bricks transversely to the previous layer, as shown in Fig. 7.

The brick clamping bars 8 and the brick retaining member 13 are withdrawn to their respective inoperative positions and the scissor lift 14 is operated to lower the pallet by the height of one brick layer as shown in Fig. 8. The loading tray 10 is then moved to its delivery position, the brick retaining member 13 is lowered to its operative position and the loading tray 10 is returned to its operative position such that the fresh layer of bricks to be cleaned is deposited on top of the layer already cleaned. The brick clamping bars 8 are moved to their operative positions and the tool bar 2 is traversed across the uppermost layer of bricks to remove mortar/cement from the upper surfaces thereof.

The process is repeated, cleaning subsequent layers of bricks until a stack of 10 layers of cleaned bricks is built up on the pallet, at which stage the scissor jack 14 has returned to its lowermost position. The operator then uses a forklift truck or similar forked vehicle to remove the pallet 15, complete with stack of cleaned bricks, from the apparatus.

The machine frame 1 is mounted on hydraulic or pneumatic leveling jacks 18 which can be extended or retracted to ensure that the support surface 3 is level.

Mortar/cement dust removal means (not shown) may be provided on the machine frame comprising, for example, an extraction fan and dust collection filter/bag.

Whilst, in the preferred embodiment, the tool bar is adapted to be traversed across the support surface upon which bricks to be cleaned is placed, it is envisaged that, in an alternative embodiment, the tool bar may be rigidly fixed

on the machine frame and the support surface may be adapted to be horizontally traversed beneath the tool bar.

It is envisaged that, in an alternative embodiment, the bricks may be loaded directly onto a pallet mounted on the support surface, avoiding the need for a loading tray. However, such would provide more limited access for the operator, leading to overstretching, and possibly increase the risk of injuries since the operator would have to reach into the working area of the tool bar.

Bricks to be cleaned may be delivered to the operator at working height on a conveyor means (not shown).

**CLAIMS**

1. An apparatus for cleaning used bricks comprising a support surface for receiving a plurality of bricks to be cleaned arranged in a layer with the surfaces to be cleaned arranged facing upwardly, an elongate brick cleaning device for cleaning the upper surface of said layer of bricks and means effecting relative displacement between said brick cleaning device and said support so that the cleaning device acts on the upper surface of the layer of bricks to be cleaned.
2. An apparatus as claimed in claim 1, wherein the brick cleaning device is displaceable horizontally or substantially horizontally over the support surface and preferably said support surface is downwardly displaceable to enable layers of bricks to be subsequently located on top of the first layer for cleaning until a stack of layers of bricks is built up.
3. An apparatus as claimed in claim 2, wherein the layers of bricks are provided on a support pallet, which is laterally removable to enable removal of a cleaned stack of bricks from the apparatus.
4. An apparatus as claimed in any preceding claim, wherein the elongate brick cleaning device comprises at least one elongate member having a plurality of planing tools mounted thereon and adapted to transmit a shearing force against mortar on the upwardly facing surfaces of the bricks.
5. An apparatus as claimed in claim 4, wherein several rows of planing tools are arranged one behind the other such that each row of planing tools engages mortar to be removed from the bricks in turn as the cleaning device traverses the layer of bricks.

6. An apparatus as claimed in claim 5, wherein the planing tools in each row are spaced, with the spacing between planing tools in each row being offset with respect to the planing tools in an adjacent row.
7. An apparatus as claimed in claim 5 or claim 6, wherein the planing tools may be replaceably mounted on the elongate member to permit the replacement of worn tools.
8. An apparatus as claimed in any of claims 5 to 6, wherein the planing tools are adapted such that a brick cleaning operation can take place on both strokes of the elongate member.
9. An apparatus as claimed in any preceding claim, wherein brick clamping means are provided for clamping the layer of bricks to be cleaned during operation of the brick cleaning device.
10. An apparatus as claimed in any preceding claim, wherein a loading tray is provided, said loading tray being moveable between a loading position wherein the loading tray is spaced from the support surface to allow a layer of bricks to be loaded onto the loading tray and a delivery position wherein the loading tray delivers a fresh layer of bricks to be cleaned onto the support surface.
11. An apparatus as claimed in claim 10, wherein a brick retaining means is provided for retaining a layer of bricks over the support surface as the loading tray is moved from its delivery position to its loading position such that the bricks are deposited onto the support surface.
12. An apparatus for cleaning used bricks substantially as herein described with reference to the accompanying drawings.



Application No: GB 0218666.6  
Claims searched: 1 to 12

Examiner: Dominic Green  
Date of search: 10 March 2003

## Patents Act 1977 : Search Report under Section 17

### Documents considered to be relevant:

Category	Relevant to claims	Identity of document and passage or figure of particular relevance	
X	1 to 6	US 2884921	(DRAKE) All figs, esp col 3 lines 49 to 71, col 6 lines 17 to 20
X	1,2,4,5,6	NL 8900183	(CORNELIS) Both figs & abstract
X	1,2,4,5,6	US 4557246	(THOMAS) Figs 3,4,5 & col 2 lines 14 to 55
X	1,2,4	US 3945151	(COOK) Esp fig 1, col 1 line 39 to col 2 line 5
X	1,2,4	GB 2288363	(GERRARD) All figs, esp page 10 paras 2, 3, & 4

### Categories:

X Document indicating lack of novelty or inventive step	A Document indicating technological background and/or state of the art
Y Document indicating lack of inventive step if combined with one or more other documents of same category	P Document published on or after the declared priority date but before the filing date of this invention
& Member of the same patent family	E Patent document published on or after, but with priority date earlier than, the filing date of this application

### Field of Search:

Search of GB, EP, WO & US patent documents classified in the following areas of the UKC<sup>y</sup>:

B5E

Worldwide search of patent documents classified in the following areas of the IPC<sup>7</sup>:

B28D

The following online and other databases have been used in the preparation of this search report:

Online: WPI, EPODOC, PAJ